



# ***EQUINE GAIT ANALYSIS SYSTEMS***

## ***User Manual.***

**V7.0**

**October 2011**



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### Document History

Version	Date	Changes
<b>7.0.x</b>	<b>October 2011</b>	<b>Initial Issue</b>
<b>7.0.x</b>	<b>October 2012</b>	<b>Picture changes for new laptop</b>

# 1. Introduction

This user guide is only applicable for Poseidon Software version 7.0.x

This user guide is intended to take you through the process of using ETB's Pegasus Gait Analysis systems. It covers all currently available systems.

Pegasus Limb Phasing

Pegasus Cannon Angles

Pegasus Hock Angles

Each of the Pegasus products builds on the functionality of the previous system. Hence the manual is written in detail for the Pegasus Limb Phasing, then only the differences are covered in the Cannon and Hock Angle systems.

If you feel we have not been clear or correct, please **do** let us know so we can improve!

# 2. Glossary

csv = comma separated variable

GPS = Global Positioning System

HTML = HyperText Mark-up Language

LED = Light Emitting Diode, the type of indicator on the sensors.

NiMH = nickel metal hydride, referring to types of battery used

PC = Personal Computer

.pdf = file in Portable Document Format (by Adobe Systems)

SD = Secure Digital (memory card)

Trial = a test, using the *Pegasus System* to gather and analyse data

USB = Universal Serial Bus

LF = Left Fore

RF = Right Fore

LH = Left Hind

RH = Right Hind

LT = Left Tibia

RT = Right Tibia

Throughout this document the following is used.

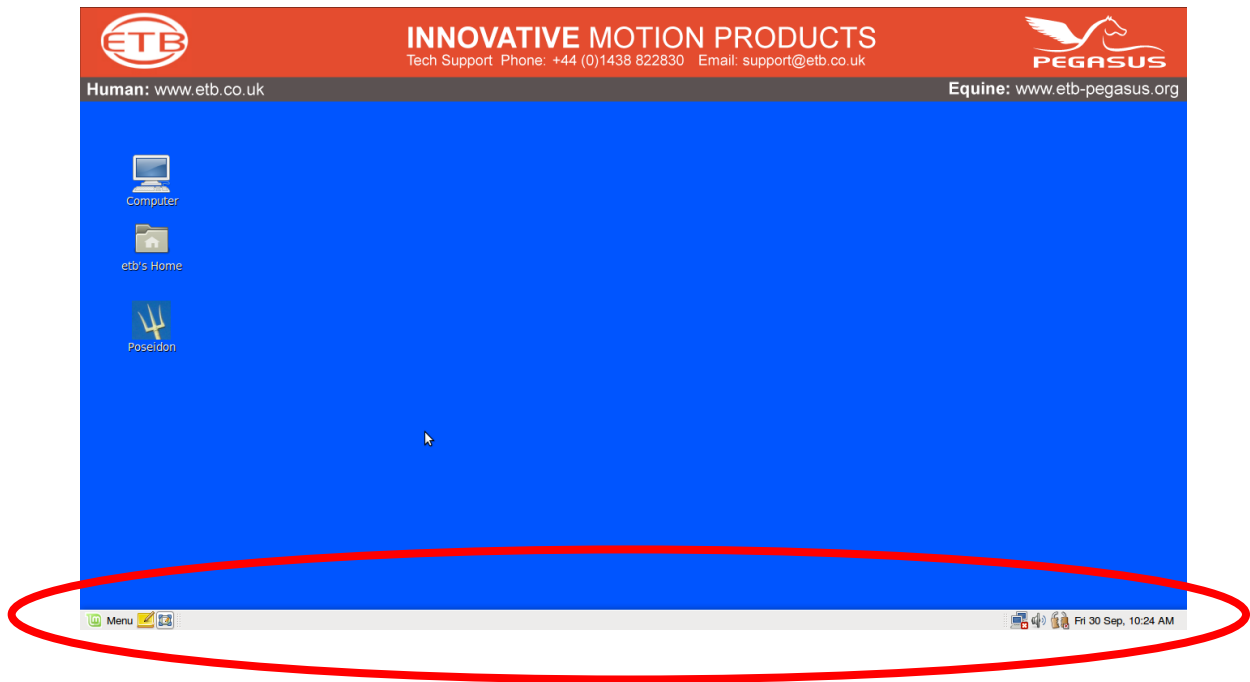
**Bold** Text in the Aerial font refers to the name of a screen button.

“Views” Names in speech quotes are area on the screen to observe or click by.

### 3. Poseidon software – a brief introduction:

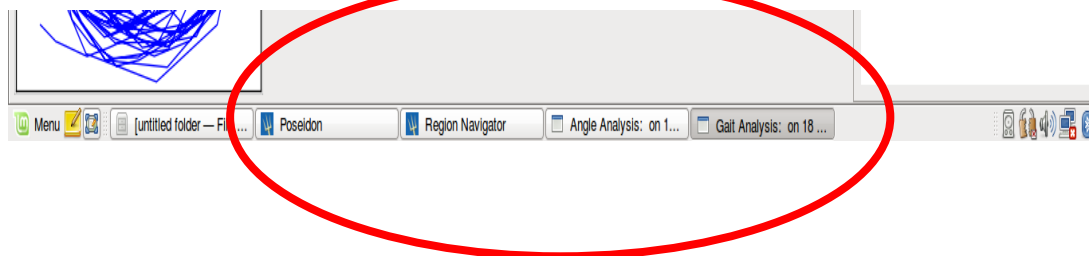
Poseidon is the software that you need at every stage apart from actually recording data and charging the sensors' batteries.

The user needs to understand the function of the taskbar. This is where the task panels are stored when using Poseidon. The main desktop is standard but Poseidon uses the Taskbar extensively during operation, especially during plotting of trial data. The screen shot below shows where the taskbar and task panels are stored.



The area highlighted above is the Taskbar.

The image below shows Taskpanels that are in the Taskbar. The user can swop between different applications in this area. Taskpanels are used extensively when the user generates plots of their trials in Cannon Angle or Hock Angle analysis.

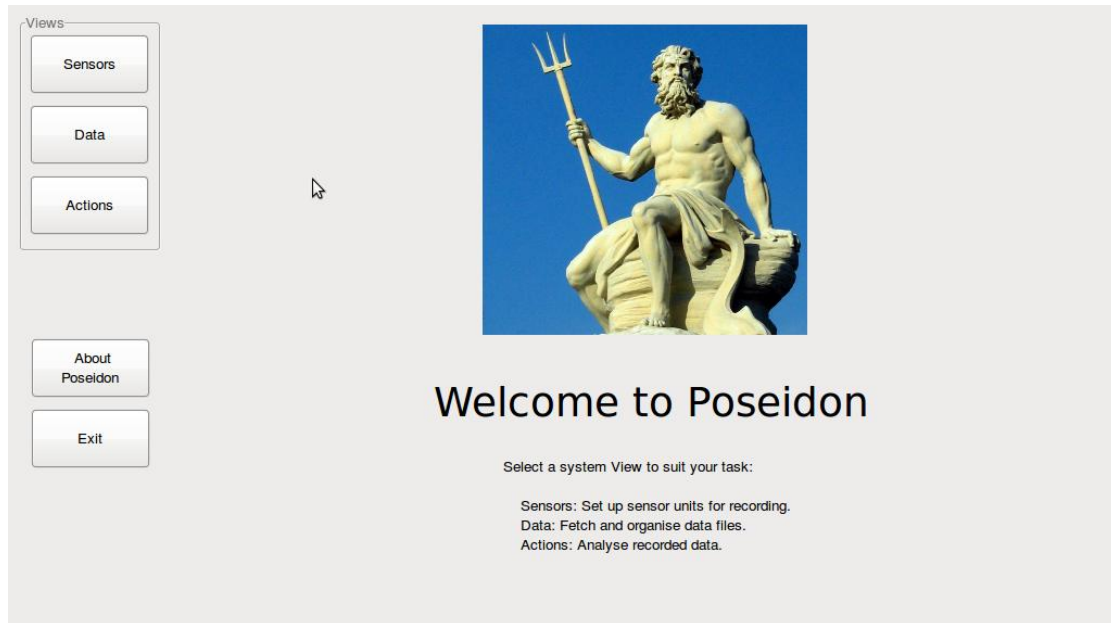


#### 3.1. Starting Poseidon

To activate it, double click on the Poseidon icon on the desktop:



This brings up the main screen, see below:



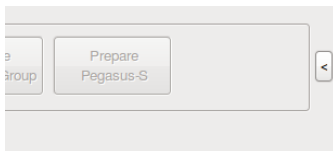
At the top left of the screen is a “Views” panel incorporating the Sensors, Data and Actions “buttons” **Note:** the “buttons” to the left and the information below the centre of the screen: it is worth pausing to read this information for each screen you encounter.

If you click on one of the “buttons” in the views panel, a new screen appears: for example, click on **Sensors** and the following screen will appear.



Notice how the selected button is now filled in within the “Views” panel. A new panel has appeared along the top called “Processes”. Buttons which are inactive are “greyed out”.

On some screens, you may see the following small button, a caret symbol, to the right of the processes ribbon.



If a sensor(s) are connected, this button allows maintenance activities, or is used for troubleshooting on other screens.

## 4. Sequence of operations (overview):

Since it can be daunting to read through a whole set of instructions, we felt it may be helpful to present the main essential process steps before describing them in detail. They are:

Preparation the day before a trial: charging the sensor batteries. This is done with the complete system.

*☺ Best Practice Suggestion: Always charge the sensors overnight before a trial.*

Preparation immediately before a trial: the *Poseidon* software sets the sensor clocks and synchronises them to each other (also done with complete system) and should be done within 1 hour of doing the trial to avoid clock drift degrading the results. This operation has two variations, depending on whether speed, stride length and location

are required, in which case the GPS unit is needed; otherwise it can be omitted, giving limb phasing, stride rate and angle data only.

☺ *Best Practice Suggestion: Always switch on Pegasus-S unit (when being used) in advance of synchronisation as this can take some minutes for Pegasus-S to lock on to satellite signals.*

Carrying out the trial (collecting the data). This is done with the sensors away from the laptop, mounted on the subject (horse or human), and running on battery power.

Download of the collected data: under the control of the *Poseidon* software, the recorded data is transferred from the sensors to the Laptop and analysed.

The process will now be described in detail.

## 5. Preparation the day before a trial:

Open the case and check that all sensors are connected to their USB cable.

Check both USB connections are made to the laptop (these should never normally be removed) on the left hand side of the laptop.

Ensure Pegasus-S unit is switched off and any Pegasus-I units are not recording (no green flashing light).

Ensure the laptop power supply is connected and plugged into a power socket.

**Take care not to trap the laptop power supply cable by accidentally closing or slamming the case lid. Do NOT lead the cable over the case side:**



**(The section of cable that plugs into the notebook PC carries non-hazardous low voltage.)**

Switch on the laptop. (*Poseidon* software does not have to be running at this stage.)

Leave overnight to enable the sensors to fully charge, which takes around 12 hours. The sensors should have the following LED indicators lit:

*Pegasus-I* amber charging LED (next to the battery symbol on the case), see image below, the orange light is lit. This will remain on while the sensors are connected to the laptop with the latter switched on (occasionally, this may change to blue but this is of no consequence: charging is unaffected).



*Pegasus-S* red battery charging LED, which initially flashes three times, then lights continuously until charged. This will extinguish when the unit is fully charged. Note: this sensor will not charge if it is switched on.





Ensure that the laptop lid remains open during charging. If it is closed it will turn off the power and the sensors will not be charged. When the lid is opened, the laptop will be locked. Enter the password given to you to gain access to the laptop. Please note passwords are case sensitive.

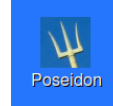
Once fully charged, the sensors will be able to record data for up to 6 hours on the day of your trial.

☺ *Best Practice Suggestion: After a trial even if it is only for a couple of hours, always charge the sensors overnight before using Pegasus the next day.*

## 6. Preparation immediately before a trial:

(In the text that follows, Poseidon screen “buttons” are referred to in this form: **button**.)

Open *Poseidon* by a double-click on the icon:



Set up the sensors by clicking on **Sensors**. There are then two options:

**Set clocks to Pegasus-S**

**Set clocks to Computer**

### 6.1. Preparation for a trial when the GPS speed, location and stride length data are required

Switch on *Pegasus-S* (small slide switch) next to the USB cable connector.

*Pegasus-S* generally needs to be operated outdoors in the clear so that it can acquire the necessary GPS satellite signals.

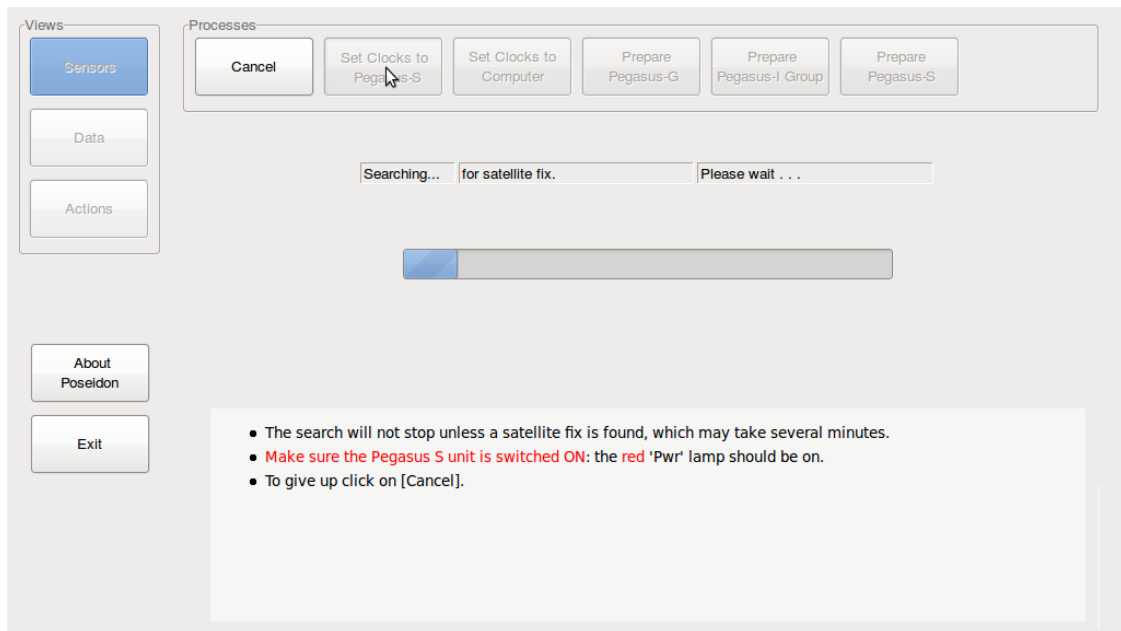
For 30 seconds to 1 minute after switching on, the blue logging LED will be lit continuously. (This period can be used to gain control of the unit from a PC, but this need not concern us here.)

If no PC connection is attempted, then once this period is finished, the logging lamp will flash, being lit and off for about equal lengths of time, while the unit attempts to acquire satellite signals.

If successful, (generally requiring the unit to be outdoors or close to a window) the logging LED will blink briefly at about the same rate as the flashing prior to acquiring satellite signals. From switching on, it may take a couple of minutes to arrive at this condition if *Pegasus-S* is in a similar location to that where last used. If it has been transported some distance in the meantime, up to 15 minutes may be needed.

Click on **Set clocks to Pegasus-S**.

The progress bar is then displayed, indicating that *Pegasus-S* is searching for a satellite fix. See screen shot below;



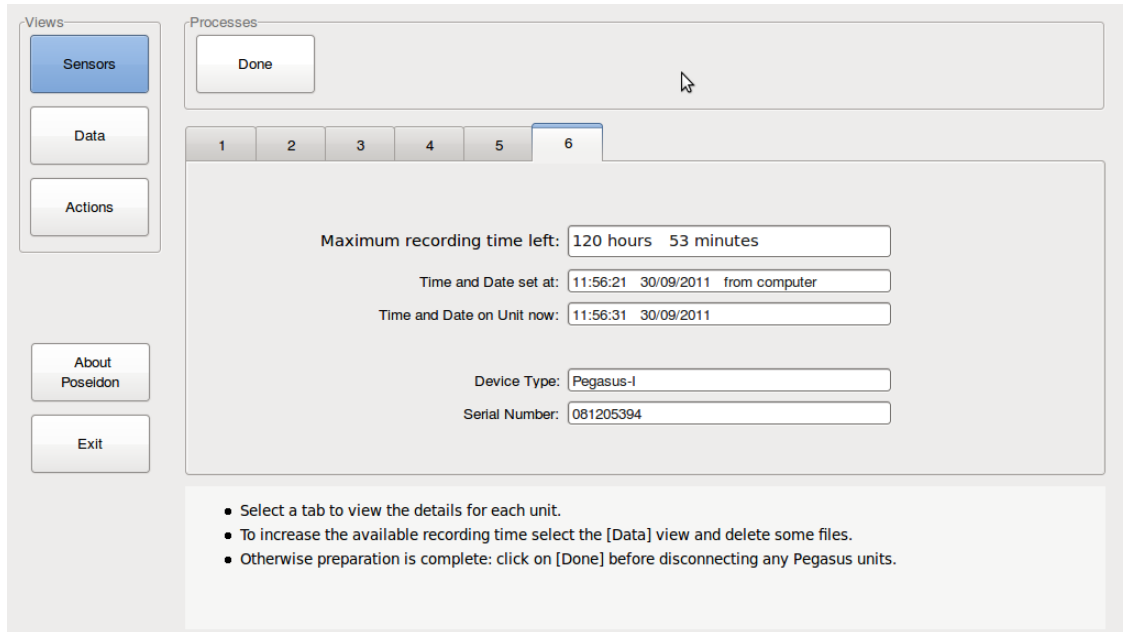
If *Pegasus-S* loses the satellites whilst being set up indoors, take the whole system outdoors and start the process again.

In rare instances, despite all sensors being connected correctly, an error message may appear stating that insufficient sensors are connected.

Should this occur, click on **Cancel**, which takes you back to the main **Sensors** screen. Disconnect the all USB connectors from the PC, then reconnect them, then proceed as normal.

If the problem persists, also reboot the laptop, then re-attach the sensors, and restart Poseidon.

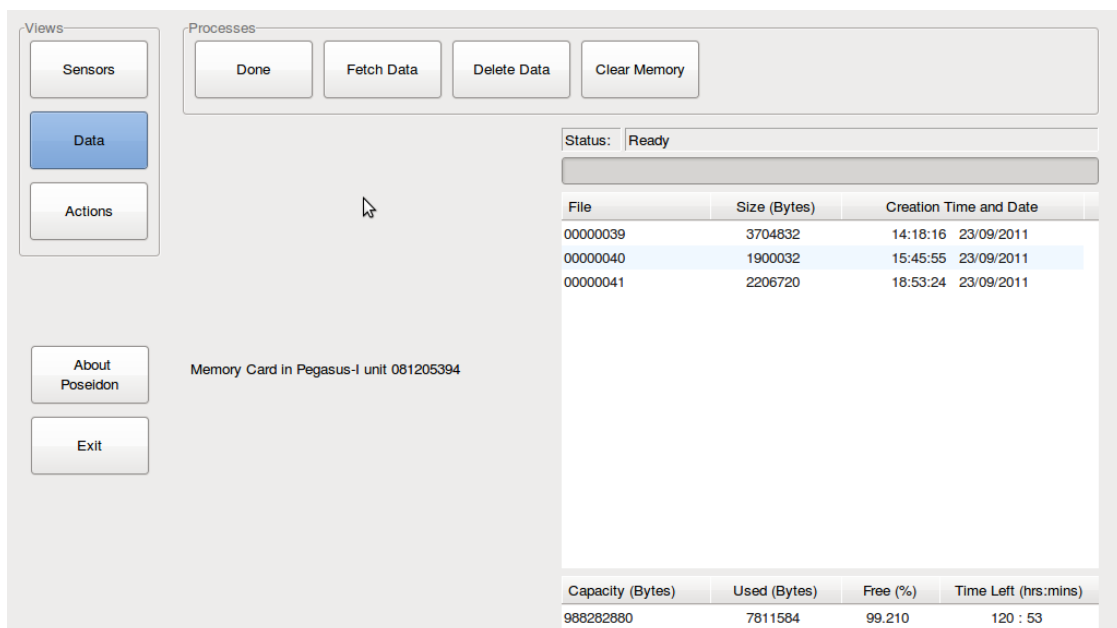
Once the satellite signals have been acquired, **Prepare Pegasus-I Group** becomes enabled: click on this. The time stamp on each unit is displayed. At the end of this procedure there will be a number of tabs depending on the number of Pegasus-I sensors connected, and a button at the top of the screen indicating **Done**. See screen shot below which is for a six sensor system showing information about the sixth sensor. To check the information for each unit, click on the tab for each sensor in turn.



Note: the order of the on-screen tabs will generally not reflect the physical order of the sensors in the case.

For each *Pegasus-I* sensor, the maximum recording time left, time and date set, the current time and data, the device type, and the serial number, are all displayed. Take a moment to check that these look correct for each of the connected Pegasus-I units before proceeding.

If there is insufficient recording time on a sensor, click on **Data** in the views panel. The files on the card are then shown. See screen shot below;



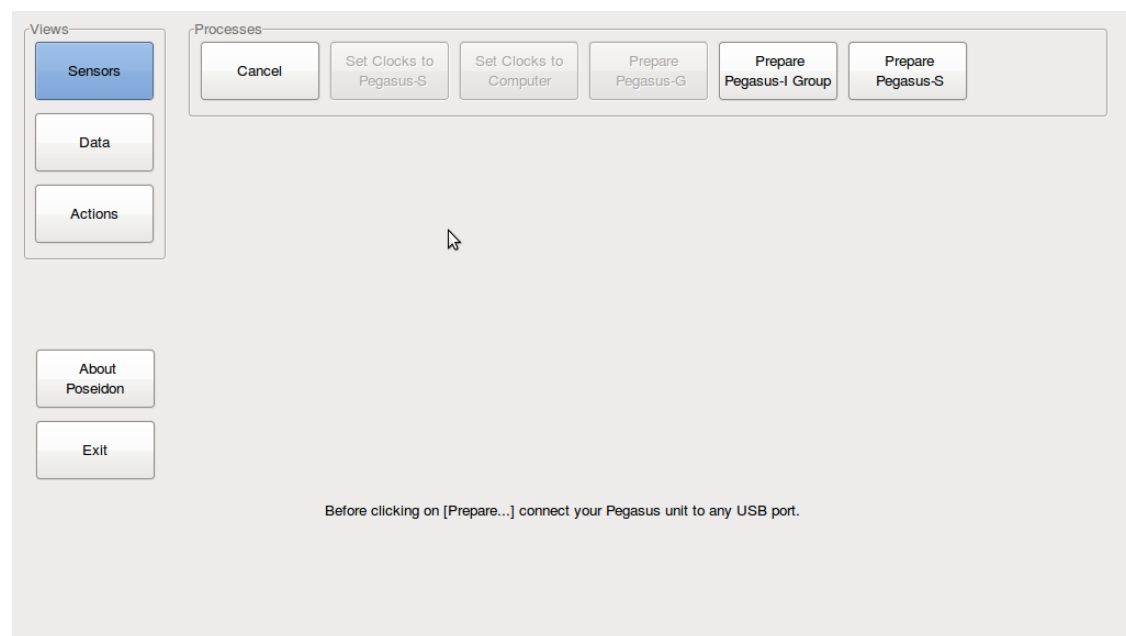
To delete files, highlight them and then click on **Delete Data**. When done, click on **Sensors** and you are returned to the sensor set-up screen. The other buttons that are available in the Processes panel are;

**Fetch Data** which is used for manual download of captured data.

**Clear Memory** which can be used for two operations, a) delete all the data on the SDcard or b) make ready a new SDcard for use by the Poseidon software.

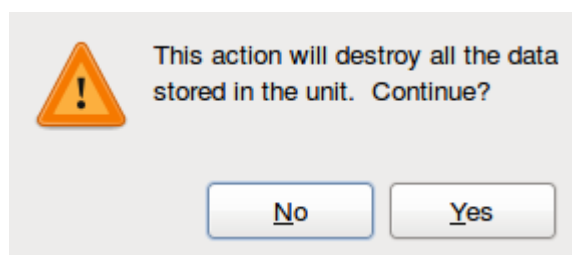
When all sensors have enough recording time for data collection, click on **Done**.

You now have two options, see screenshot below;



If you have a dual system (two sets of Pegasus-I sensors), then connect another set of Pegasus-I sensors then press **Prepare Pegasus-I Group**. You will then be taken back to the previous screen when you are happy that the sensors are all ok.

Now select **Prepare Pegasus S**. a Popup window appears saying “Are you sure?” See below;



Select **Yes**, then **Done** in the Processes panel. All the sensors are now ready for a trial.

- Switch off the Pegasus-S sensor and disconnect each of the sensors and proceed to carry out your trial.

☺ *Best Practice Suggestion: Always prepare the Pegasus-S because if you don't the memory will get full, and earlier data will be overwritten. Also when the memory is near full it will take longer to download the GPS data for your trial.*

## 6.2. Preparation for a trial when the Pegasus-S sensor is not required.

If you do not need speed, stride length or location, choose **Set clocks to Computer**: The only options then available in the Processes panel are **Cancel** and **Prepare Pegasus-I Group**.

Click on **Prepare Pegasus-I Group**, the progress of setting the time stamp on each unit is displayed then follow the same instructions as before for clearing sensors of excess data.

When all sensors have enough recording time for data collection, click on **Done**.

Disconnect each of the sensors and proceed to carry out your trial.

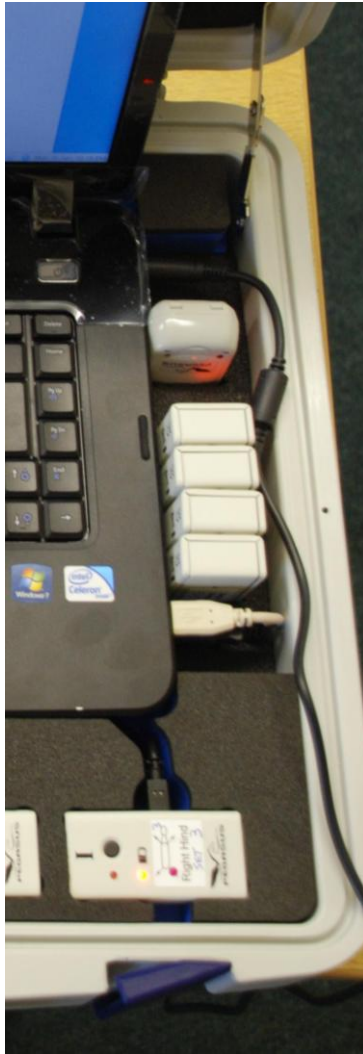
☺ *Best Practice Suggestion: If you notice that the number off files is larger than that displayed in the window (there is a scroll bar on the right side of the window) and you have to scroll down, you should delete the earlier dated files. Ensure you have previously saved the data from the sensors.*

## 7. Dual Sensor system

Some users like to operate the equipment using two complete sets of sensors. Having two sets of sensors allows the user to do the following;

- Carry out a test on more than one subject at the same time.
- Have a test being carried out whilst down loading a set of trial data.

If you have purchased or upgraded to this system, the Pegasus box has been modified to include a charging station. The power supply has been removed from the right hand side of the box, and an insert that holds the four Pegasus-I sensors and the Pegasus-S sensor takes its place. See photograph below. The mains power supply is connected as normal, but is stored in the supplied rucksack. The sensors are now considered a set, so the labels for both the Pegasus-I and Pegasus-S sensors are annotated with Set 1 and Set 2. Ensure you keep the sensors in their designated sets otherwise you will get incorrect results.



The second set of sensors are connected to the laptop using two USB cables on the right side of the laptop. This configuration allows the user to charge two complete sets overnight and reduces the need for extra boxes to house the sensors.

Note: Charging this many sensors at one time reduces the recording time of the sensors from 6 hours 4 hours.

### 7.1. How to operate a dual Sensor System

You can only prepare one set at a time.

Remove the two USB cables from the right hand side.

You may have to lift the laptop slightly to remove the connectors.

Now synchronise the sensor set for the front sensors as normal, and disconnect all of them from the laptop (that also includes the Pegasus-S even if it is not to be used).

You can now reconnect the two USB connectors on the right hand side, and synchronise the second set.

Now carry out your trials.

Once the trial(s) have been completed carry out the following;

- Connect the first set of sensors at the front and analyse the data.
- Once complete, disconnect and remove the sensor set.
- Attach the next sensor set to the front and analyse the data.
- If you connect both sets of sensors you will receive error messages that too many sensors are connected.

Once your day's trials are complete, attach one set to the front, and the other set to the charging station. Both sensor sets can now be charged overnight.

## 8. Performing a trial:

The trial should be carried out within an hour of setting up the sensors. If this is not the case, the sensors should be set up again following the procedure described in the previous section. This will ensure that all sensors remain adequately synchronised.

Take the four *Pegasus-I* units plus 4 brushing boots, the *Pegasus S* unit (where used) and the hat silk (where used) or saddle cloth to the horse.

### 8.1. *Pegasus-S* placement:

[If you are not using a *Pegasus-S*, because you don't need speed, stride length or location, skip this section and go straight to placement of *Pegasus-I* units.]

Switch on the *Pegasus-S* wait for the blue logging LED to blink regularly and briefly, indicating that it has acquired the satellite signals.

Place it in the silk with the blue logging LED facing upwards to the point of the hat, or facing upwards in the saddle cloth.



Stay in the clear and do not move indoors or the satellite fix may be lost.

### 8.2. *Pegasus-I* placement:

Put the brushing boots on the horse (colour and type may vary to the image shown here), using the lower Velcro strap only. **Make sure the strap is tight and secure or the results will be degraded if the boots do not sit securely against the leg throughout the trial:**





**[Each sensor has a label which defines on which limb it should be placed. It is essential that each sensor is mounted in the correct location and orientation.]**

Take a *Pegasus-I* and press the button once, checking that the unit is logging data (green LED blinking).

Place it in a clear polythene bag to keep out dust and moisture.

Fit the *Pegasus-I* into the appropriate brushing boot pocket, taking careful note of the label indicating its position on the animal. The unit should be upright (not inverted), and the LEDs should face outwards:



Once in the pocket the second Velcro strap should then be fastened. **Again, make sure the strap is tight and secure:**



Repeat these steps for the three remaining *Pegasus-I* sensors.

The horse is now required to remain stationary for 5 seconds to allow the sensors to calibrate.

The horse should now be exercised as required for the trial.

Once the trial is complete, remove the brushing boots from the horse.

Remove the *Pegasus-I* sensors from the pockets.

Check that only the green status LED is flashing (the presence of amber indicates a stuck sensor or a loose memory card: if this happens, refer to the Sensors Manual).

Stop each *Pegasus-I* logging by pressing the button once: no LEDs should remain lit or flashing.

Remove the silk.

Retrieve *Pegasus-S* from the pocket and switch it off.

## 9. Limb Phasing: Retrieving and analysing data from the trial:

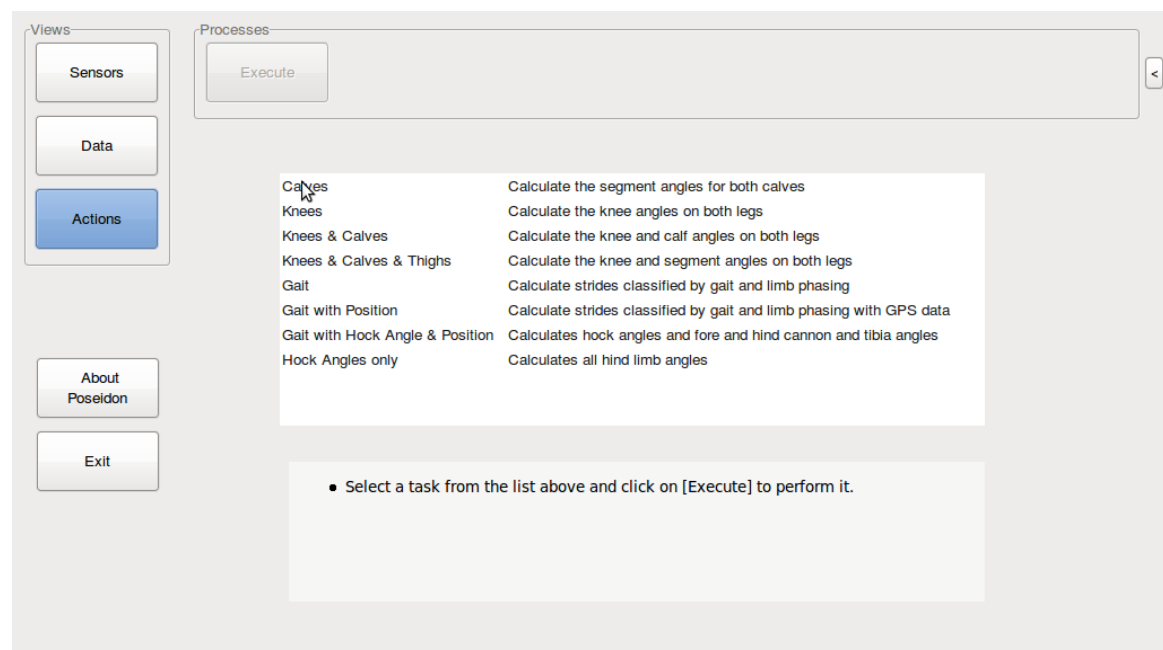
The system is designed to make the analysis of data immediately after a trial as quick and easy as possible.

Return to the laptop and open *Poseidon*.

Connect the required number of *Pegasus-I* units used during your trial (the order in which the *Pegasus-I* units are placed in the recessed foam within the case does not matter).

Connect the *Pegasus-S* and switch on.

From the views panel select **Actions**, you will be presented with the following screen.



The white box in the centre of the screen lists all of the actions that can be carried out. The list shown depends on the type of system that you have purchased.

In this example we will calculate "Gait with position"



Using the cursor highlight “Gait with position” then press **Execute** from the Processes panel. You cannot start the task by double clicking on it.

You will be presented with the following screen.

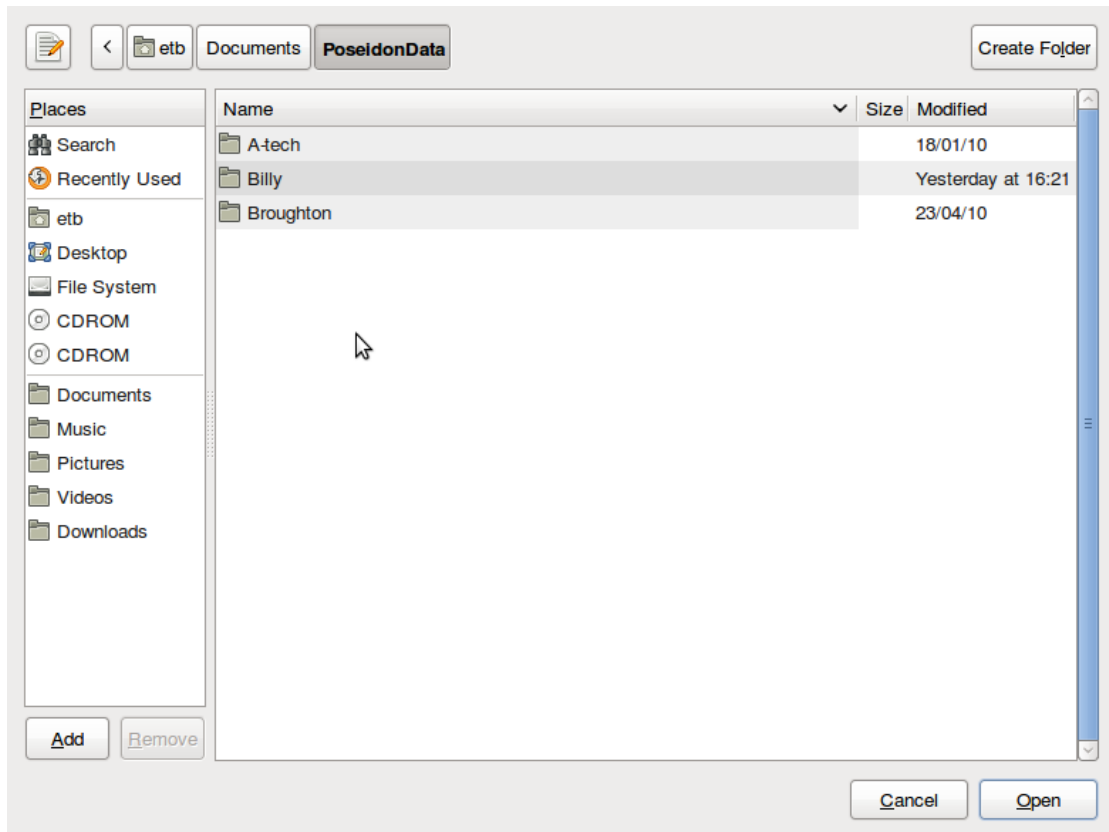
The screenshot shows the 'Processes' panel of the Poseidon software. On the left, there is a 'Views' sidebar with buttons for 'Sensors', 'Data', 'Actions' (highlighted in blue), 'About Poseidon', and 'Exit'. The main area of the 'Processes' panel contains a 'Cancel' button and a 'Continue' button at the top. Below them is a 'Subject:' label followed by a text input field. A checkbox is checked, with the text 'Check here if you wish to save the raw data from the units as files on the computer'. At the bottom, there is a list of three bullet points: 'The subject title is optional. If you don't want it, ignore it.', 'If the units are connected when you click on [Continue] the most recent raw data will be fetched automatically.', and 'Otherwise you will be prompted to choose data files already on the computer.'

Place the cursor in the “Subject” field and type in the name.

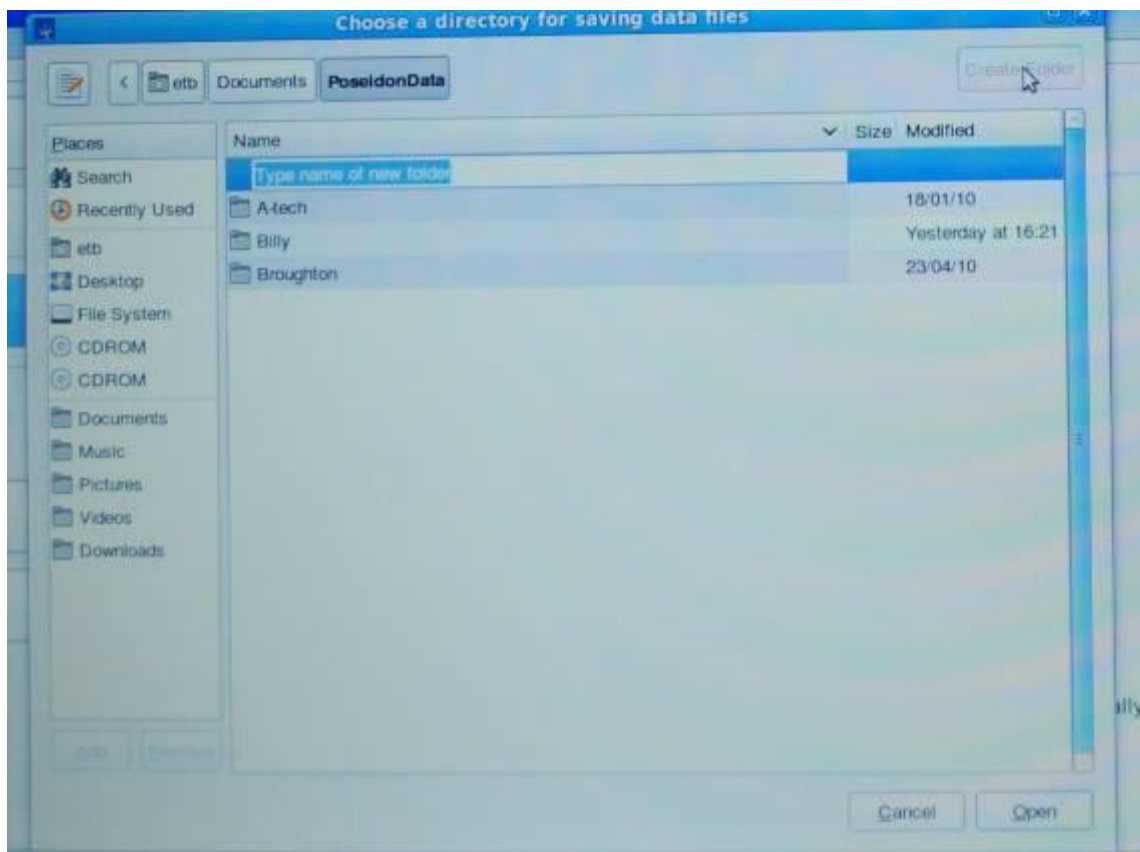
We strongly advise that you save the data files generated by the sensors. By doing this you can go back through data at any time and run further investigations on the trials you have run, or send it to ETB for analysis.

If you wish to save the sensor data, click on the square alongside the line: ‘Check here if you wish to save the raw data from the units as files on the computer.’ You will then be asked where to store the data. See screen shot below. If you look at the screen shot, it shows folders set up for three horses called A-tech, Billy and Broughton.

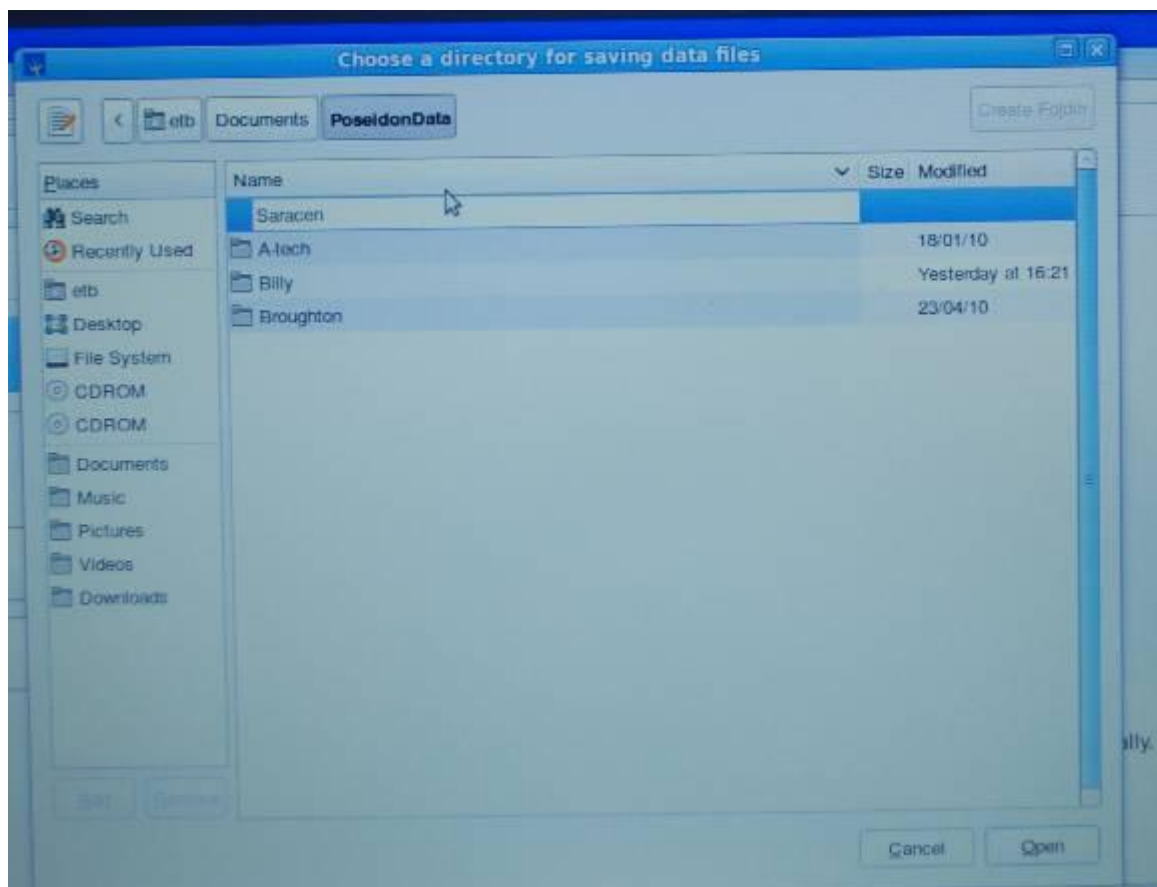
☺ *Best Practice Suggestion: Save each test in its own folder. So for example if we have just done a trial on a horse called Saracen, we would create the folder as follows. The folder where the computer is suggesting is ‘etb/Documents/PoseidonData’ See the top line of the window below. In all folder operations, this line informs you of where you are looking and where any data will be saved.*



In the top right hand of the window you will see the button **Create Folder**. Click on this and the list of folders will drop down and a blue band will appear with the following text in it 'Type name of new folder', see below.



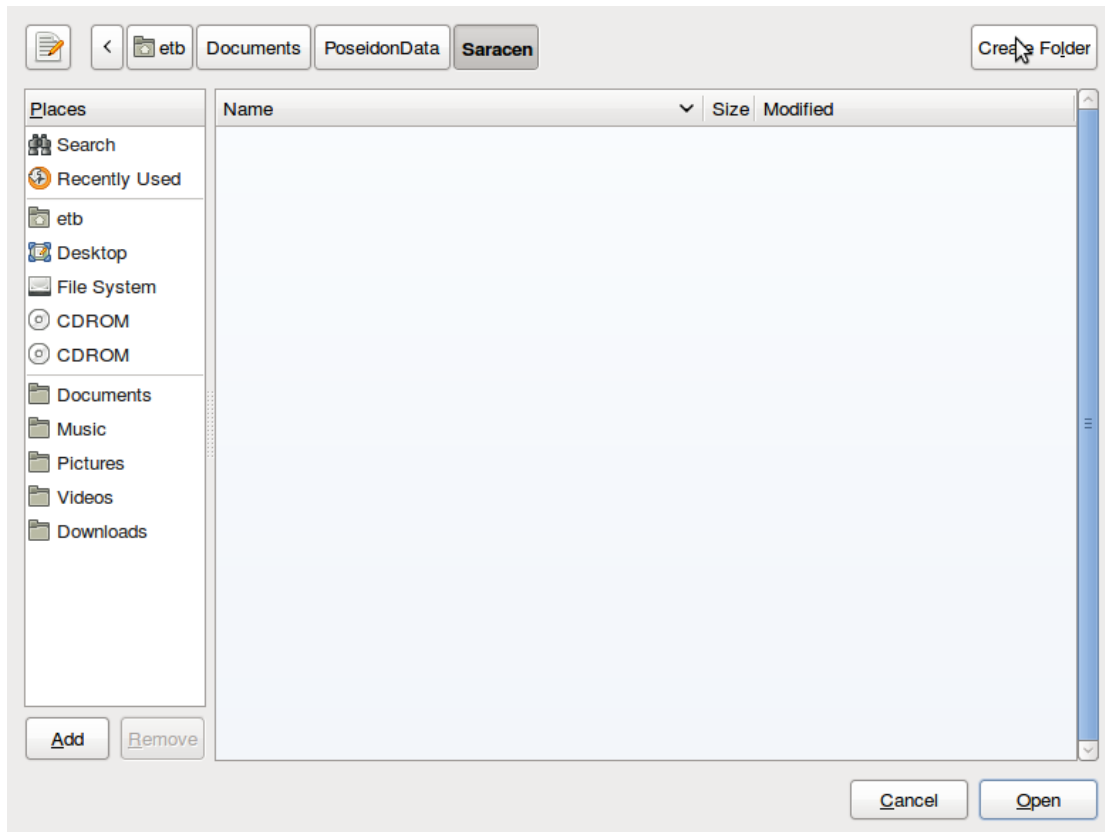
Place the cursor in the box and type the name, in this example it will be 'Saracen'



**Do not press the 'Open' button in the bottom right corner.**

You press the enter key on the keyboard, or click in the blue area next to the Saracen folder name on the right. This is the strange part of the process which is out of ETB's control, it is the operating system. You will soon get use to this.

Ok, now either click in the blue area on the right next to the Saracen file name, or press the **return key** and you will get the window below.

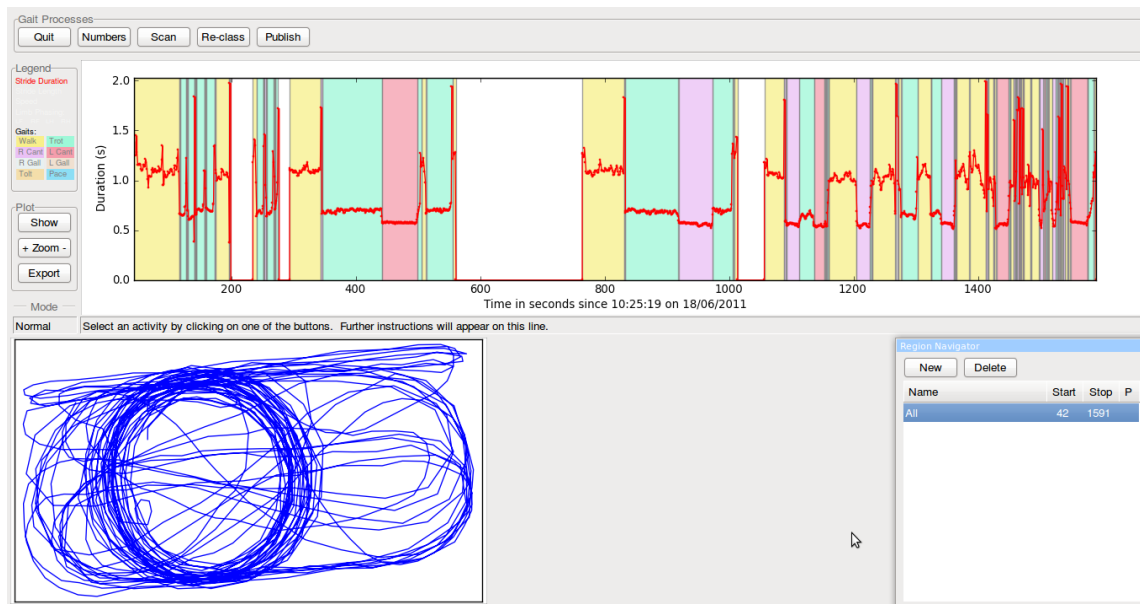


You can now see that we are at the etb/documents/PoseidonData/Saracen folder. Now you can press **open** and the data from the sensors will be saved in this folder.

A progress bar is then displayed, together with information as to the current stage in the process which may take several minutes, depending upon the duration of the trial. The stages are: collecting data from the units, processing the data, and calculating the results.

Once the analysis has been completed a screen shot similar to the one below will be displayed.





The top half of the screen shows the entire trial with automatically generated gait types (i.e. walk, trot et al) plus stride duration.

Two graphs are shown on the screen as well as a window called the “Region Navigator”. The lower part shows the GPS plot of where you rode. The “Region Navigator” is a floating window that allows you to easily add regions of specific interest from your trial.

You can now switch off *Pegasus-S*.

## 10. Presenting the results

The following results presentation facilities are provided:

- Statistical data in tabular form for all of the trial and any sections of the trial that you have chosen.
- Graphical presentation of the data with options as to what is displayed.
- Report generation in HTML format.

### 10.1. Tabular presentation:

The table provides a summary overview of the trial, see below.



In each gait, the following data is quoted:

- Total number of strides
- Time taken
- Distance covered

The average, low and high values for the limb phasing, stride duration, speed, and stride length are quoted.

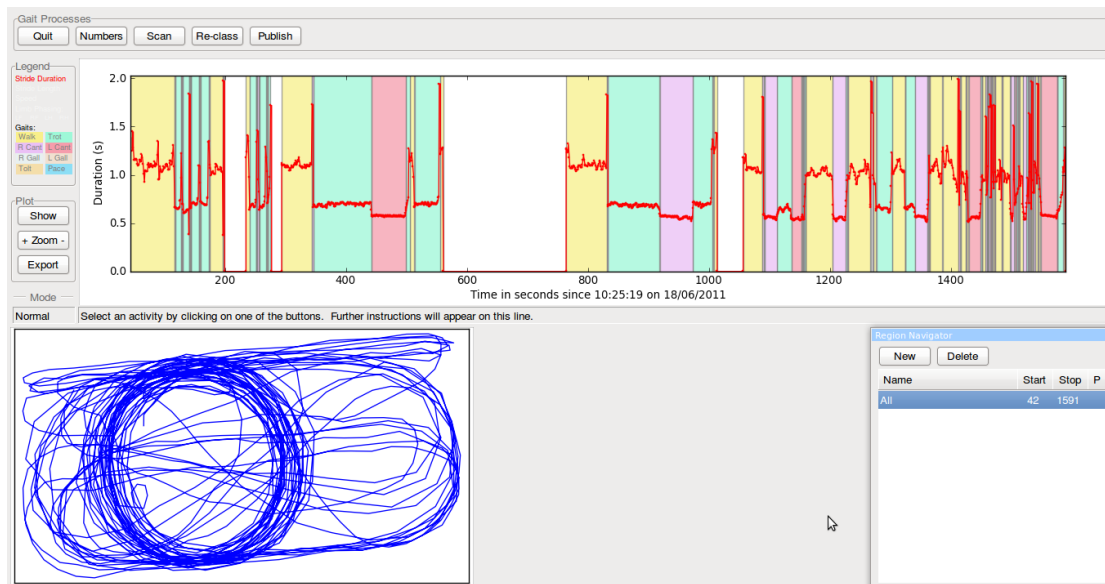
Limb phasing is quoted as a percentage of the total stride. For all gaits the reference limb is taken as the left-hind except for left canter/gallop when the right hind is taken as the reference.

For trot, an additional two figures are quoted, diagonal asymmetry and hind limb asymmetry. Diagonal asymmetry is defined as RF-(LF-RH). Hind leg asymmetry is defined as (50%-RH).

These two additional values are calculated from the individual limb phasing values and provide a way of quickly assessing any asymmetries at trot.

## 10.2. Plotting the data

A typical view of the data is shown below.



The plot of the trial is then shown with the stride duration, below which is a GPS position plot. In the Gait Processes panel at the top of the screen, you have a number of options available to you for selection.

- **Quit, Numbers, Scan, Re-class Publish**

And further options available in the Plot panel, on the left side;

- **Show, Zoom, Export**

**Show:** This opens a window labelled “Select for Display” The contents of this window vary depending on the item that you selected to execute after you pressed the **Actions** button. See screen shot below.

Check the variables you want to appear on the main graph

Stride Length  
☐

Speed  
☐

Limb Phasing:  
☐ LF      ☐ RF  
☐ LH      ☐ RH

OK

Click in the appropriate box where you would like to add more plots to the graph then press **OK**. These values are then added to the graph and the legend on the left hand side is shown for each of the lines added.

Note: LF = Left Fore  
LH = Left Hind  
RF = Right Fore  
RH = Right Hind

**Zoom:** enables sections of the time graph to be expanded. When you press the **Zoom** button it renames itself to **Hold** and the curser changes to a large plus sign. Move the cursor to the top left of the portion of the graph you wish to analyse. Hold the left mouse pad key down whilst moving the cursor to the bottom right of the section you wish to zoom in on, then release the left mouse pad key. The zoomed section will then be displayed. To return to the full view, place the cursor over the chart and press the right mouse pad key. You can zoom in a number of times. To work with the selection that you have zoomed in on, click on **Hold**. To return to the full view, click on **Zoom** then place the cursor over the chart and press the right mouse pad key. You have to do this for the number of times that you zoomed in. To exit the zoom function, click on **Hold** and the curser will return to a pointer.

**Export:** enables you to include in your report as many plots of different sections from the charts as you wish. These files are stored with a .png extension. When selected, you will be asked to give the plot a name and identify the destination folder. Give the plot a title that means something, for example “1<sup>st</sup> trot in warm up”: this will be saved with the plot. All zoomed sections can be exported, giving comprehensive images of your trial. Ensure you save the plots in the correct folder.

**Scan:** This function allows you to follow the GPS tracking and watch it against the graphs of the gaits. A cursor appears: place this over the point on the chart where you want to start scanning from and commit with the left mouse pad key. A red dot is displayed on the GPS plot. Press the right key to move the cursor to the right: on the GPS plot the red dot moves along the trace, and the starting position is indicated by a white dot. Press the left key to return to the start point.

Note, if you keep the right key pressed it will appear to move automatically as this equates to many key presses. To scan a different point, simply move the cursor to the new start point, press the left mouse pad button and start again. When finished scanning, click on **Clear**. Please note the scan does not go backwards.

**Re-class:** enables you to reclassify a section. This can be done in a zoomed view to make it easier to identify the correct strides. The curser takes the form of a large thin cross. Move the cursor to where you want to start the section for re-classification and ‘left mouse click’, a blue vertical line is added to the graph which is the starting point for reclassification. Note that the cursor will move to the start of a stride. Move the cursor to past the end of the stride you want to re-classify and left mouse click. The second blue line will then appear and a dialogue box will appear showing all the types of gaits that can be chosen for that region. If you have chosen the wrong starting point press the **Undo** button. Select the one you want by highlighting and clicking on

the left mouse button. The section will then be redefined and the colour will alter to that of the gait chosen. Click **Done** when you have finished. The following gaits that can be re-classified are:

- Unclassified, Walk, Trot, Right Canter, Left Canter, Right Gallop, Left Gallop, Tolt, Pace.

Note: Tolt and pace are gaits that are not automatically recognised by Poseidon. In these cases each section would need to be chosen and reclassified by the user.

**Numbers:** To see the statistics of a trial click on **Numbers** button. This will display the summary statistics for the entire trial. A typical screenshot is shown below;



The lower portion of the screen has changed. The GPS plot has been removed and replaced by the statistical table showing the different gaits. You can see that the “region navigator” partially covers the data. To remove this there are two options.

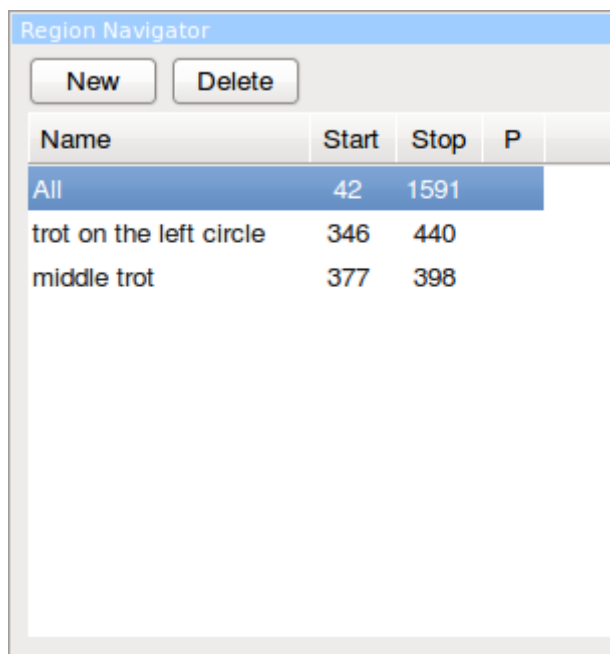
- Position the cursor at the top of the window and left click move the window to another position.
- To turn off the “Region Navigator” you can “right click” on the “Region Navigator” in the taskbar. A selection window appears. Untick “Always on Top”. If you now click anywhere outside of the “Region Navigator” window it will disappear. To use the “Region Navigator” again just click on the “Region Navigator” in the taskbar.

We now want to use the “Region Navigator” so get it back on the screen.

The “Region Navigator” window has two useable buttons, **New**, and **Delete**. The Region labelled ‘All’ is shown and the data pertaining to the complete trial is detailed in the table below. Note: any white regions were the automatic gait classifier does not

understand the gait information are not included in the summary table. If you know what gait should be in the white areas, you can use the **Re-class** button, see previous sections. The default table shown is for the complete plot. To obtain statistics for a specific section, click on **New** in the “Region Navigator” pane. Now move the crossbow cursor to the start time that you want to examine. Left click puts the blue start line in place. Move the cursor to the end of the region you want to examine and left click. It will then put a second blue line, and a window will open requesting you to “enter a name for the selected region”. Type in a name, for example ‘trot on left circle’ and then press **Ok**. It will then show a plot of the zoomed section plus the statistics for that region.

To select another completely different region move your cursor to the ‘All’ label in the ‘Region Navigator’. You can now select another region. Also note that in the ‘All’ display you will see the blue lines for each of your previously selected regions. The “Start” and “Stop” headers in the region navigator inform you of the selected start and stop times along the x-axis of the time graph. See example below;



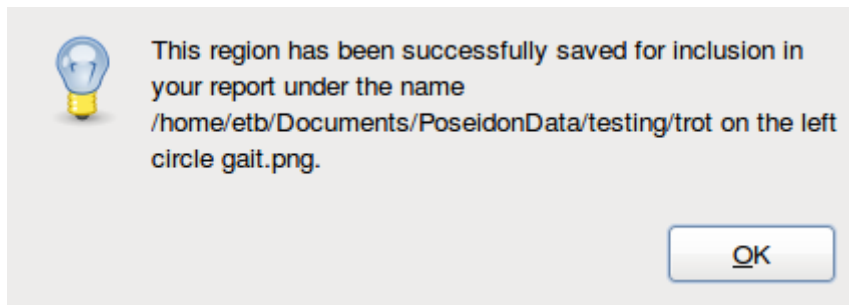
The screenshot shows a window titled "Region Navigator" with two buttons, "New" and "Delete", at the top. Below the buttons is a table with four columns: "Name", "Start", "Stop", and "P". The table contains three rows of data. The first row, "All", is highlighted with a blue background. The second row is "trot on the left circle" and the third row is "middle trot".

Name	Start	Stop	P
All	42	1591	
trot on the left circle	346	440	
middle trot	377	398	

To display your selected regions just click on the name you have given it within the ‘Region Navigator’. The display shows the region that you selected.

You can zoom in on any section within the zoomed section.

If you want to keep that plot and the data click on **Publish** in the Gait Processes panel. A window will open called “Poseidon information”, see screenshot below.



The window informs you the name and what folder the information has been stored in. You click **OK**. It will then store this data for the report. You may notice that another window is sitting on top of the “Gait Analysis” window called “Poseidon”. Do not close this, to get back to the Gait Analysis window just click anywhere on that window. You will also notice that in the “Region Navigator” that the column “P” has an asterisk “\*” against the region name.. This informs you that you have published that region and it will be included in the report. **Note:** If you decide that you no longer wish to have a region published, just delete it from the “Region Navigator”.

To save other sections repeat the same process. If you want to delete any sections, then highlight the section in the “Region Navigator” and press **delete**.

Poseidon is saving each of the regions in preparation to produce your report. Each region will appear in the report in the order you Publish them. If you publish the same region more than once, it will be in the report more than once.

To return to the complete trial move the cursor up to ‘All’ and left click. To publish the data for the complete trial press **Publish** when ‘All’ is highlighted.

**Note:** The statistical data for all the trial provides the median, and the upper and lower interquartile range.

For the zoomed sections it provides the median and the min and max values. This means that the maximum stride lengths for example in the chosen region are provided.

If you are in the **Re-class** section, and you have reclassified an unusual large number of different gaits, the statistical table will have a slider bar on the bottom allowing you to scroll so that you can see all of the statistical data.

To return to the original view, click on the **Location** button.

Note: If you have not selected the ‘All’ region in the Region Navigator and the press the **Location** button the system will display the zoomed section and you will not be able to get back to the full trial plot. To return to the full trial plot, click on **Numbers**, and select ‘All’ in the Region Navigator window and then click on **Location**.

### 10.3. Saving the data:

When you are finished analysing regions, you can now click on **Quit** which takes you back to the Poseidon window. If you have made a mistake and want to carry on analysing regions, then click on the **View Gait Results** button and you will be taken back to the “Gait Analysis” window.

To save the results click on **Save** in the Processes panel. A window opens asking you for a file name. Check that the file will be saved in the folder that you are working in, and then press **Save**. This saves the results as a .csv (comma separated variable) file which can then be reviewed at a later date or exported into other software packages.

☺ *Best Practice Suggestion: To aide your memory it is best to call the file the same as you do when producing your report.*

**Note:** Once you exit the Poseidon programme you will not be able to add any other sections of data. So ensure you have completed your analysis and areas of interest, saved a CSV file and created your report.

## 10.4. Preparing a report:

A report can be produced by clicking on the **Report** button. The “Report Title” defaults to the one entered when initially downloading the data from the sensors. This can be edited by simply typing the new title in where the existing title is displayed.

If you want to enter any comments or observations, this is done in the free form “Comments” section. Enter any text to include in the report: for example, “The first 2 minutes were un-ridden, the rest ridden” or “Horse kept spooking in the right hand corner of the ménage”. This will put context behind some of the results. Note: this box is free form text so no formatting of the text occurs.

When complete click the **OK** button.

☺ *Best Practice Suggestion: Include facts such as horse’s details, protocol of trial, where trial was held and any significant points of relevance.*

If you want to analyse more regions you can click **View Gait Results** and carry on.

Note: If you have completed all of your analysis you can now press **Done**. This takes you back to the window that is presented when you click the **Actions** button.

If you realised that there was another region you wanted to review, then the only way to do that is to re-analyse the data from the beginning. See the section on “Obtaining the results from saved data”.

An .html report is now generated and stored in the same folder as the sensor data and exported plots. To open the report, navigate to the correct folder and double click on the \*.html file, where \* is the name you have given to the report. This will open the web Browser where you can review the report. In order to safely transmit the file so other people can review it, you need to save it as a .pdf file.



## 10.5. Creating PDF of your report

To convert the html file into a pdf file open up the .html file by clicking on it, or by opening Mozilla Firefox. Click on **File** then choose the **Print** option.

In the print window under the General Tab, click on **Print to File**

The window will change.

Change the '.ps' to file name of your choice.

Change the output format by clicking on the 'radio button' to **PDF**

"Save in folder", navigate to your folder by clicking on the down arrow and select "other" to allow you to browse.

Click on **print**

Although you have saved the PDF as A3 page size, it can be printed on A4. Do not change this option as the graphs and table will be truncated.

*© Best Practice Suggestion: IF you forget to change the location of where you want to save the file, you will find it in the default folder called "etb". You can then move the file to where you are storing the data of your trial.*

## 11. Storing data for later analysis or clearing data from the sensors:

The system is configured to automatically analyse the most recent set of data. If more than one trial has been carried out before returning to the PC, the data for earlier trials must be taken off the sensors and then analysed.

To save data from the units open *Poseidon* and then click on **Data**, (screen left hand side). The following options are then available along the top:

- **Access card reader**
- **Access Pegasus-I**
- **Access Pegasus-S**

**Access card reader** should be chosen if the micro SD card has been removed from the *Pegasus-I* unit, placed into a SD card adaptor and then inserted into the card reader on the PC. This is only advisable if the file size is very large and would therefore take some time to download using the USB connector. The micro cards are very small, easy to mishandle and fiddly to remove and put back into the *Pegasus-I*. If the card reader option is chosen, the files on the micro SD card will be displayed. Choose the files for download, by selecting **Fetch Data** and the destination folder and then **OK**. A progress bar will then show the data being transferred. Once this is completed the **Ready** status is shown.

If you wish to delete data, highlight the files to be deleted and select **Delete Data**. In the next dialogue, confirm by selecting **Yes** and the files will be deleted.

If you wish to clear the memory and reformat the card, select **Clear Memory**. You will then be asked if you are sure. In the next dialogue, confirm with **Yes** and the micro SD card will be reformatted. Click on **Done** when finished.

**Access Pegasus I** provides the safer and easier (but slower) way to extract data from *Pegasus-I* by downloading the data directly from the unit. Ensure that only one *Pegasus-I* is connected before selecting this option. To make the data structure easy for subsequent analysis, one file should be selected and placed in the folder set up for a particular trial; for example 'Saracen lunged June 14<sup>th</sup> 09'. To do this, highlight the appropriate file and click on **Fetch Data**. The progress bar indicates the data transfer to the chosen folder. When completed the **Status** returns to **Ready**. Repeat the transfer process for as many files as required, putting each into a unique folder.

If you wish to delete files, highlight them and click on **Delete Data**. A dialogue allows you to confirm or cancel. Click **Yes** and the files will be deleted.

If you wish to clear the memory and reformat the card then select **Clear Memory**. In the dialogue which opens, confirm with **Yes** and the micro SD card will be reformatted. When finished select **Done**.

Repeat the above for each of the four *Pegasus-I* units in turn. You should then have a number of folders, each with four *Pegasus-I* data files. Note, downloading using this method the files do not have the prefix of LF, LH, RF or RH. You need to ensure that each folder contains all four files to allow Poseidon to analyse the data in the saved files.

**Access Pegasus-S:** if you wish to access the *Pegasus-S*, switch it on and select this option which then allows you to fetch the data or clear the memory. To fetch the data click on **Fetch data** and navigate to the destination folder, then select **Save**. The progress bar will then show the data being saved.

To clear the memory, select **Clear Memory**. You will then be warned that this will destroy the data. Selecting **Yes** clears the memory.

Note: if the same *Pegasus-S* was used for a number of trials without clearing the memory, there is a single file which only needs to be downloaded once. It can then be copied into all the other folders which relate to the other trials that it covered.

When data storage or deletion has been completed for all *Pegasus* units, select **Done**.

## 12. Obtaining the results from saved data:

This applies to data downloaded from the units and organised into separate folders, as described in the previous section. To analyse these files, first disconnect all the sensors. The *Poseidon* software will then search for the files on the laptop, rather than the sensors. Open the *Poseidon* software. Click on **Actions** in the Views panel. Select the type of analysis that you wish to carry out. For example "Gait & Position" and then click **Execute**. Enter the subjects name, and then click on **Continue**.

Now instead of navigating or creating a folder to save the files to, you are now requested by the top banner of the window to “Choose the matching Pegasus-S file”. Navigate to the Pegasus-S file that you want to use. Click on **Open**.

The window will change to “Select a set of Pegasus-I files”. It defaults to the same folder that you just used to select the Pegasus-S file. You will be asked to navigate to where the four *Pegasus-I* data files are stored. Highlight the four files. IF you have already analysed the data previously they will all have a different prefix, RH, LH, RF, LF. If you previously downloaded them by using **Fetch Data** they will not have these prefixes, you can now click on **Open**. A progress bar is then displayed, together with information as to where the system is in the procedure. The stages are: collect data from the units, processing the data, and calculating the results. This may take several minutes, depending upon the duration of the trial. From this point the operation of the software is the same.

## 13. Cannon Angles

The cannon angle product is a software module add-on to the Limb Phasing product.

This part of user guide takes you through the process of using the *Pegasus Equine Cannon Angle System* to gather data on a horse’s gait, retrieving that data, and finally analysing it.

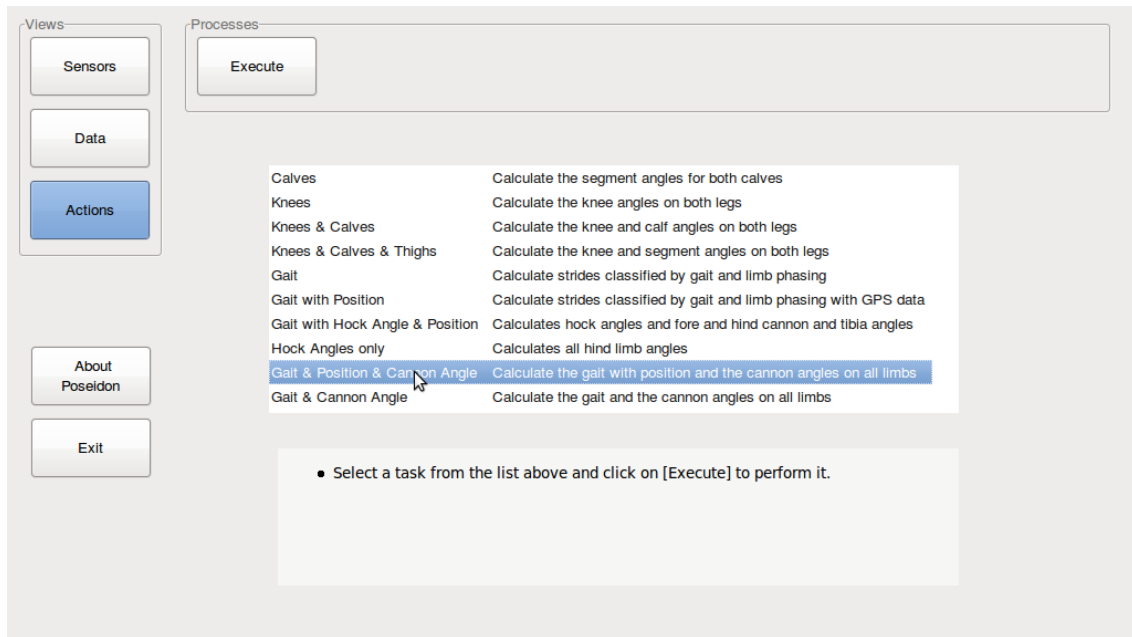
It covers all routine procedures, and with sufficiently frequent use, you will need it less and less.

Pre-requisite to this section. Before using this part of the manual, you need to fully understand how to use the Pegasus Limb Phasing product. This manual only covers the areas that are relevant to the user for obtaining Cannon Angle data. All other aspects of setting up the system, sensors, saving data are all covered in the previous sections.

### 13.1. Retrieving and processing data:

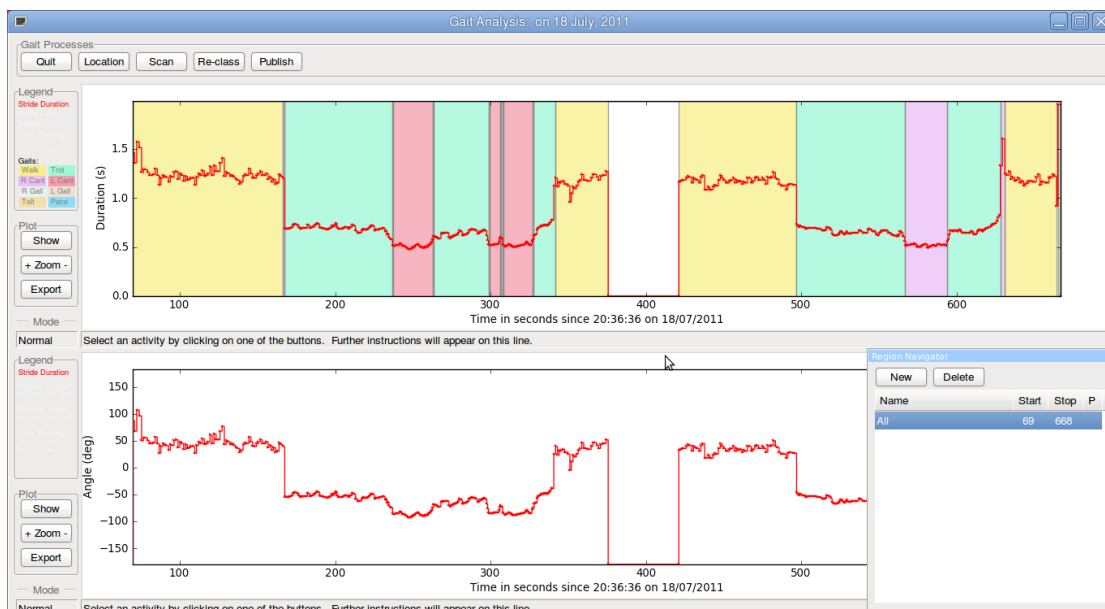
The system is designed to make the analysis of data as quick and easy as possible.

Open Poseidon and click on Actions which brings up a screen similar to that shown below. You can now click on a task that mentions cannon angles.

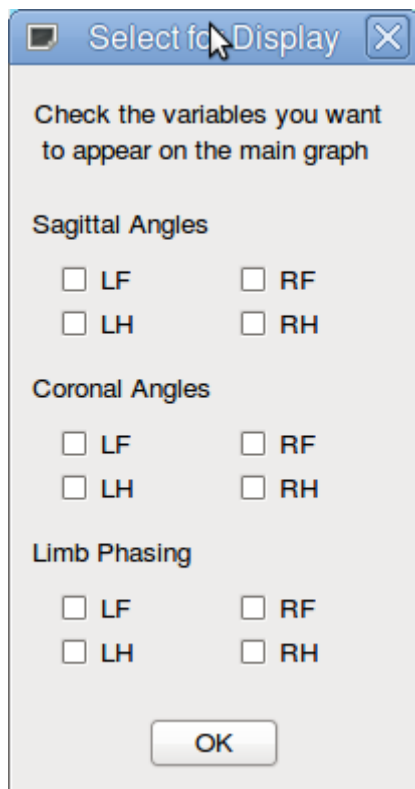


After analysis of the data you are presented with the standard screen showing the Gait Analysis.

In the Gait Processes panel the second button labelled **Numbers** now has an additional choice as well as **Numbers** and **Location**. There is now a third item to the cycle labelled **Angles**. If you click on **Numbers** and you will get the gait tables, then click again on **Angles** and you will now see a secondary plot below the gait plot. See below.

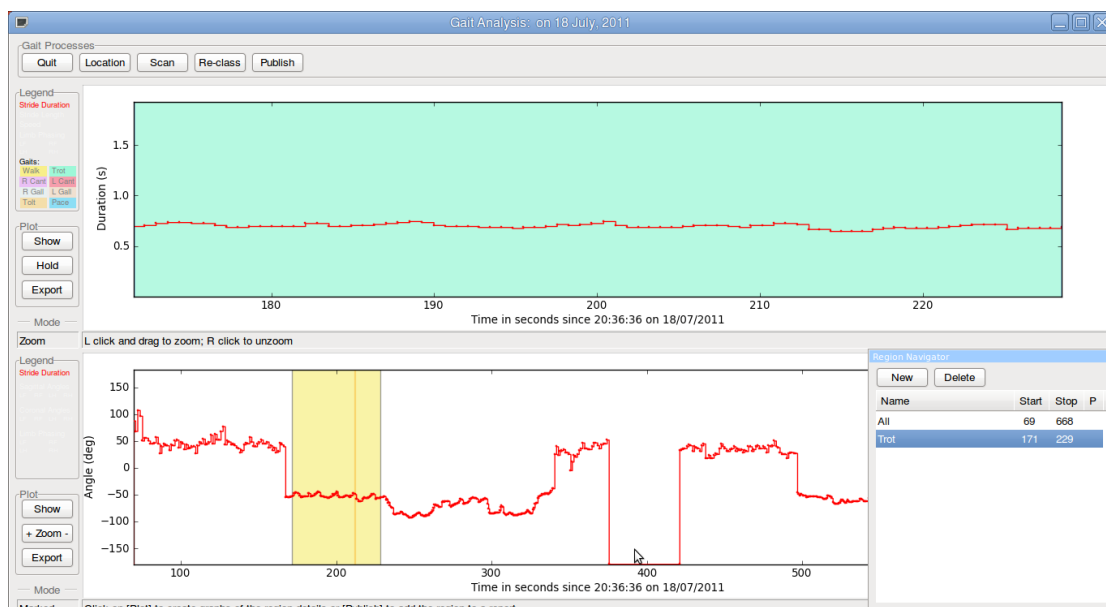


This is the angle plot graph and it behaves just the same as the top gait plot. You can zoom, show different parameters and export the plot. Click on the **Show** button in the Angle plot on the left hand side of the graph and you are presented with the following selections;



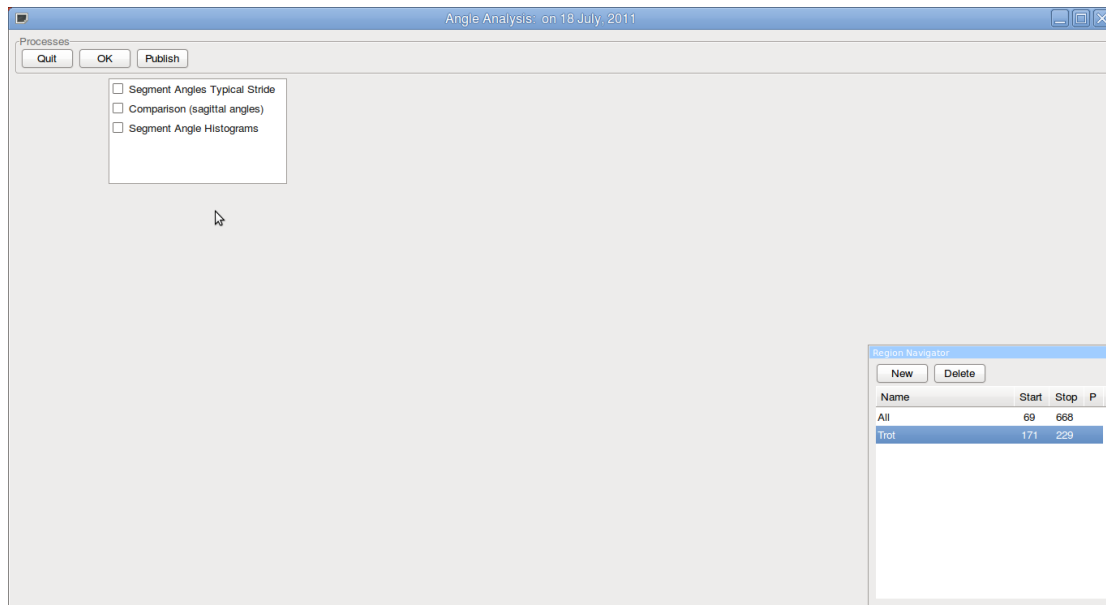
You have three selections of plot, Sagittal Angles and Coronal Angles which show how the cannon bone is moving in those planes for each individual leg. The third selection also allows you to overlay the limb phasing information if required. You can click on any combination of legs and/or angles.

You select a region for analysis just the same as in Limb Phasing, but you now get the region of interest chosen in the Angles graph along with the typical stride of the selected region. See screen shot below.

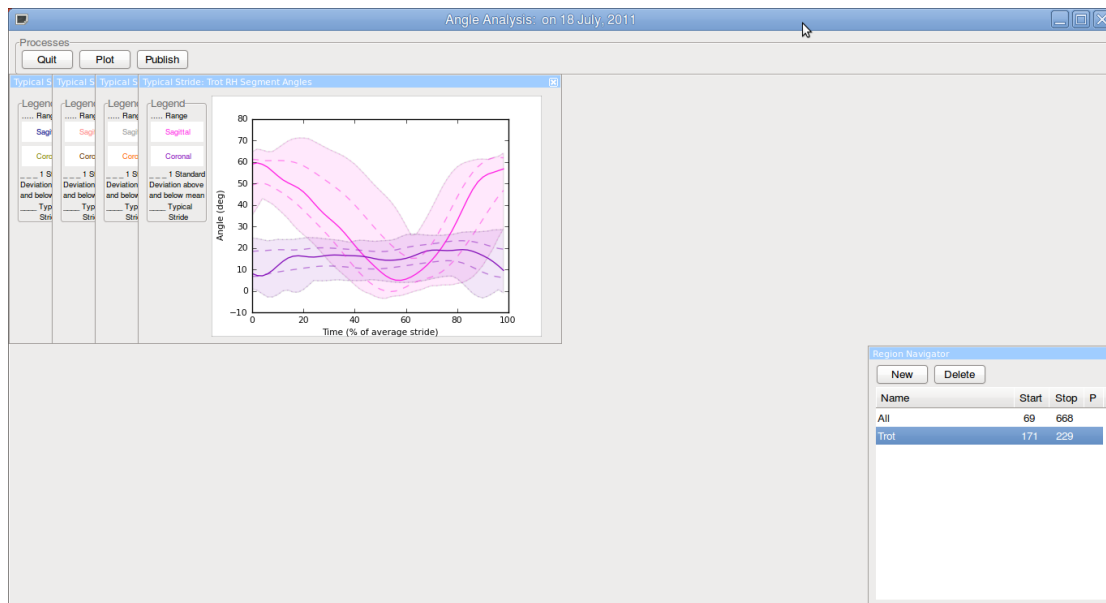


If you look at the taskbar along the bottom of the screen, there is a taskpanel labelled "Angle analysis". If you click on it now you will see under the Process panel there

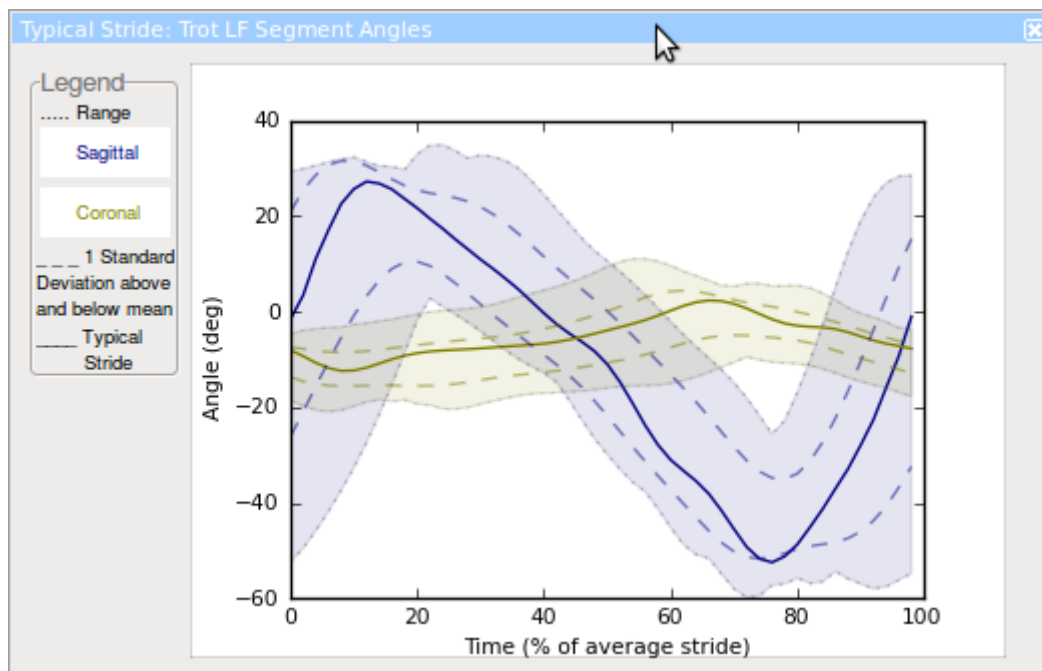
are three buttons **Quit**, **Plot** and **Publish**. If you click on **Plot** you will be presented with a window asking for a selection, you can select as many as you wish. See screen shot below.



If you click on “Segment Angles Typical Stride” the window will change to that shown below.

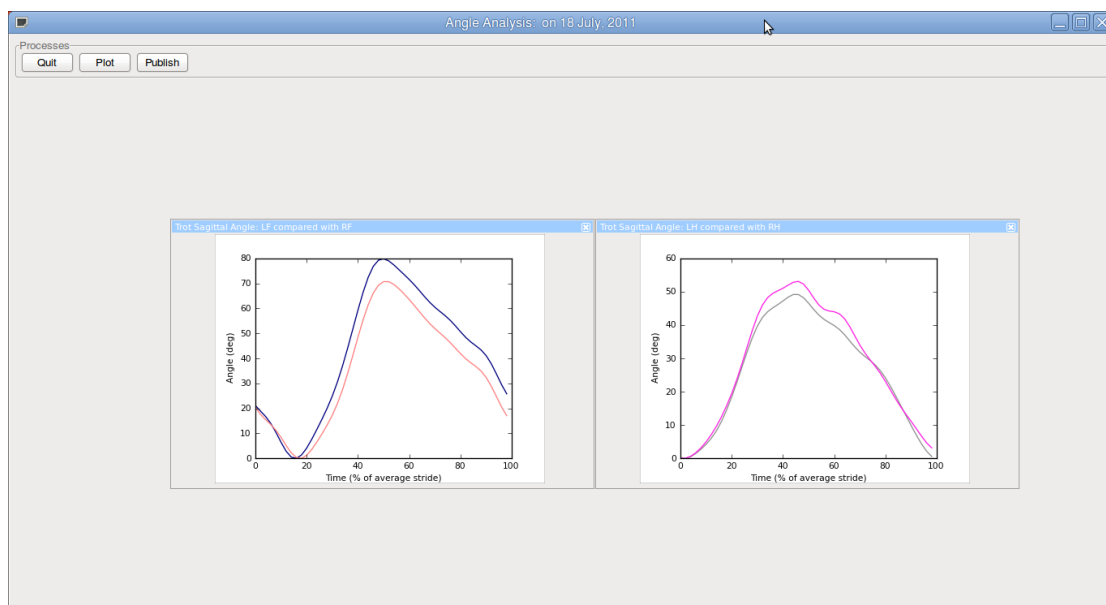


You have four plots showing the typical stride for each cannon bone in the sagittal and coronal planes. The graph shows the following,



Range which is shaded, the typical stride which is solid and one standard deviation above and below mean is dashed. This is for all the strides that were selected. All the graph windows can be moved around the screen for easier viewing.

If "Comparison (sagittal angles)" is selected. You get two plots shown below.



These plots show the comparison of the Trot Sagittal Angle LF compared to RF. One for the fore limbs and one for the hind limbs.

The third selection is the "Segment Angle Histograms". This shows the number of strides against the Peak-to-Peak Angle for the Sagittal and Coronal planes for each cannon bone. Each plot can be moved around the screen for easier viewing.

All the plots mentioned before can all be seen at once if you select everyone, but the screen does get very busy.

As with the Limb Phasing you can **Publish** the plots for insertion into the final report. Press **Publish** then click **OK**. Note: Only the graphs that are present on the screen or those listed a taskpanels in the taskbar when you press plot will be included in the report.

On the “Region Navigator” you will have a “>” symbol under the “P” column indicating that the angle plots have been published in the report. You may also have an “\*” if you have previously published a gait plot.

You can go back to the original screen and carry on doing further analysis.

When you have published all your selected regions you can run your report as normal.

All other activities, saving, further analysis, are the same as the Limb Phasing section.

## 14. Hock Angles

The Hock Angle product is not only a software module add-on to the Limb Phasing and Cannon Angles, it also comes with another two Pegasus-I sensors.

This section of the user guide takes you through the process of using the *Pegasus Hock Angle System* to gather data on a horse’s gait, retrieving that data, and finally analysing it.

It is assumed that you are proficient with the Pegasus Limb Phasing and Cannon Angle systems use. Only differences applicable to hock angle are covered in this section.

### 14.1. *Pegasus-I* placement:

**[Each sensor has a label which defines on which limb it should be placed. It is essential that each sensor is mounted in the correct location and orientation.]**

Attach the cannon straps as per the Limb Phasing section. Now attach the two hock straps. Make sure each strap is tight and secure as the results will be degraded if the sensors are not held firmly in place.





Take a *Pegasus-I* and press the button once, checking that the unit is logging data (green LED blinking).

Fit the *Pegasus-I* into the appropriate strap pocket, taking careful note of the label indicating its position on the horse. The unit should be upright, button uppermost (not inverted), and the LEDs should face outwards, away from the leg. As already noted, it should be parallel to the direction of leg swing:



Repeat these steps for the remaining *Pegasus-I* sensors.

Once data collection is complete, remove the straps from the horse.

Remove the *Pegasus-I* sensors from the pockets.

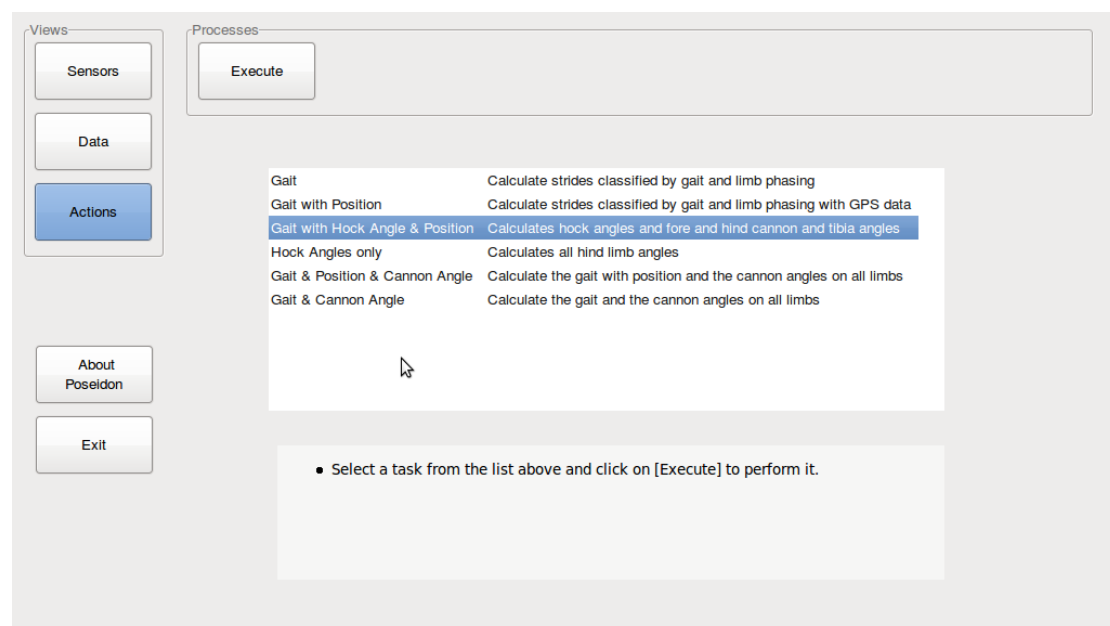
Check that only the green status LED is flashing (the presence of amber indicates a stuck sensor or a loose memory card), if this happens, refer to the *Pegasus-I* Sensor Section.

Stop each *Pegasus-I* logging by pressing the button: no LEDs should be lit.

## 14.2. Retrieving and processing data:

The system is designed to make the analysis of data as quick and easy as possible.

The screen now behaves in a similar manner as for Cannon Angles. Start Poseidon and press the **Actions** button. For Hock angle you can select with or without position data. See screen shot below.



After you have analysed the data from the sensors, the second button in the Gait Processes panel cycles, but the default display is joint angles for the left and right hock.

Clicking on **Show** in the Plot panel for the hock angles brings up the following "Select for Display" panel. See screen shot below.

Check the variables you want to appear on the main graph

**Joint Angles**

☒ LT^LH      ☒ RT^RH

**Sagittal Angles**

☐ LF      ☐ RF  
☐ LH      ☐ RH  
☐ LT      ☐ RT

**Coronal Angles**

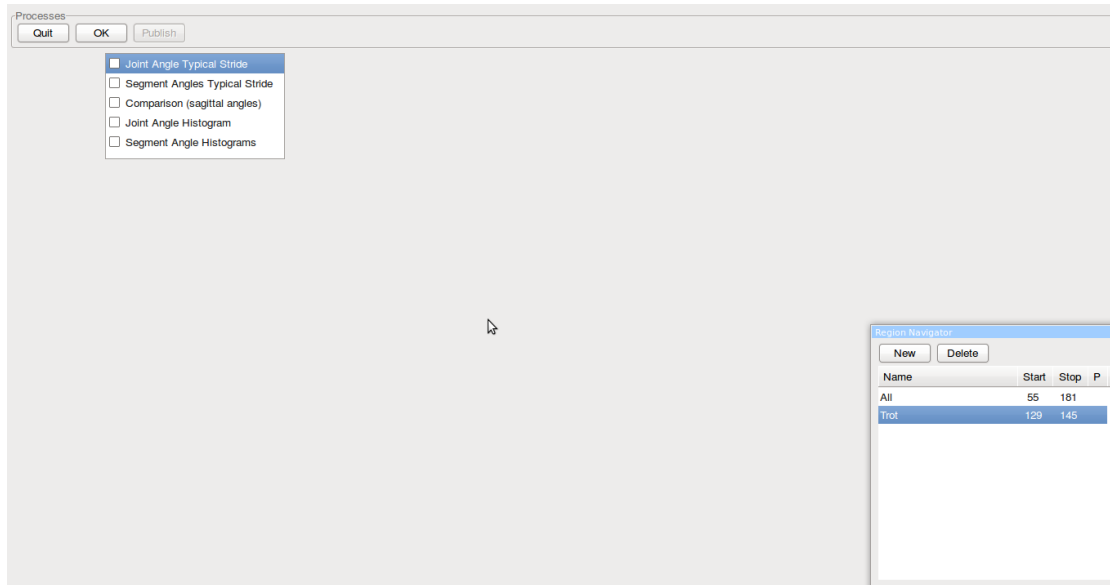
☐ LF      ☐ RF  
☐ LH      ☐ RH  
☐ LT      ☐ RT

**Limb Phasing**

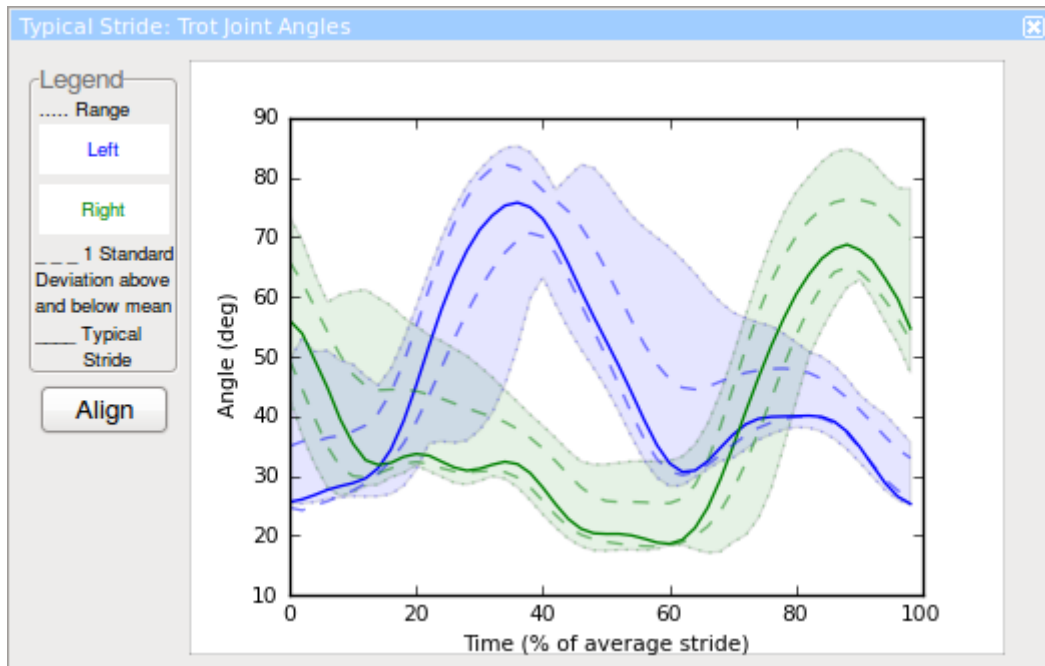
☐ LF      ☐ RF  
☐ LH      ☐ RH

The main change from the Cannon Angles is that the default setting is Joint Angles. In the Sagittal and Coronal Angles you now have the ability to look at both the left and right tibia.

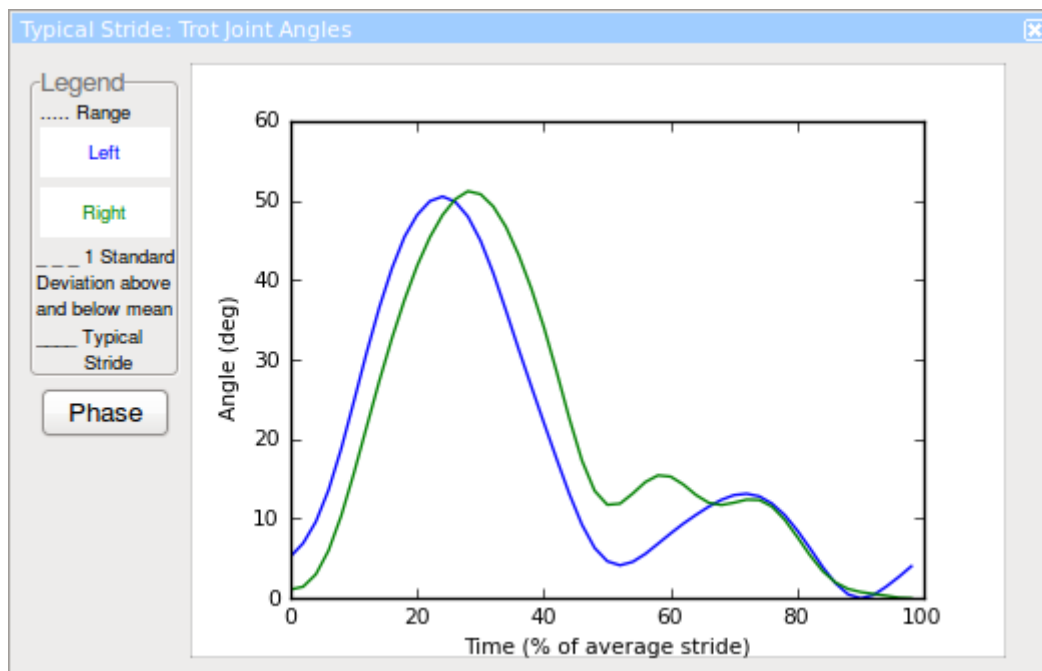
The process is now the same as for the Cannon Angles. The only other difference is the extra plots that can be derived. Go to the Angle analysis taskpanel, in the Processes panel click on **Plot**. The plotting choices have been enhanced. See screen shot below.



Select “Joint Angle Typical Stride” press **OK** and the following graph is shown.



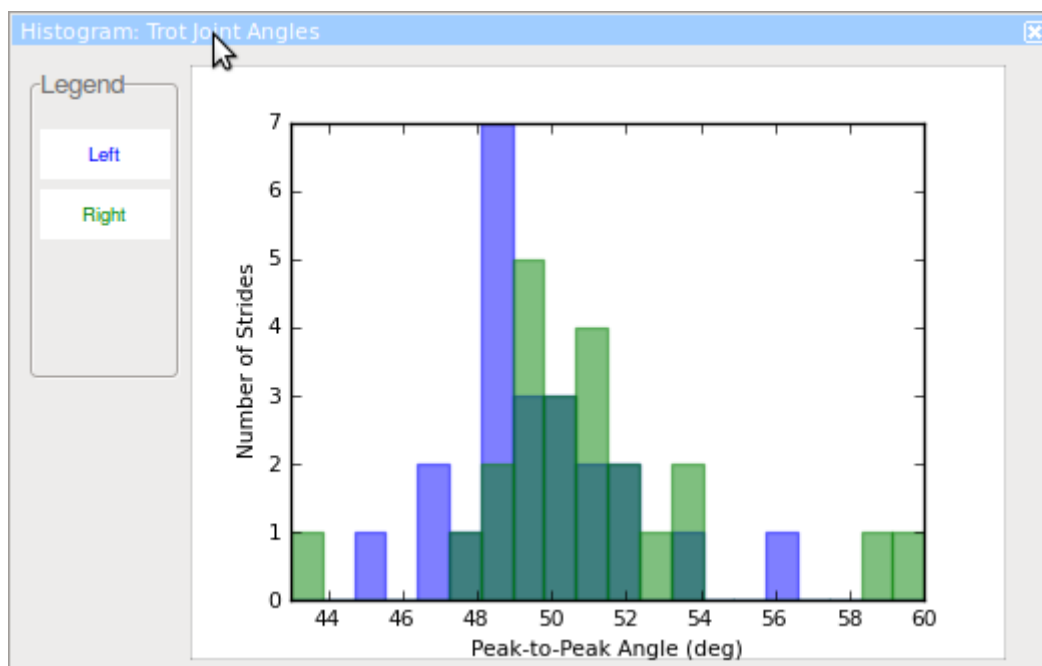
This is the phased Hock Angles for the left and right. To see how they vary between left and right press the **Align** button. See below.



Plotting the “Segment Angles Typical Stride” gives the same as Cannon Angles but with two added plots for the Tibia left and right.

“Comparison (sagittal angles)” gives an extra plot of the Right Tibia compared to the Left Tibia.

“Joint Histogram” is new and shows the left and right joint angle histogram, see screen shot below.



“Segment Angle Histograms” now has the left and right tibia plots making a total of six.

Publishing the data is exactly the same as the Cannon Angle product.

## **15. Using a new memory card in *Pegasus-I*:**

You are encouraged to use only the card supplied with your *Pegasus-I*. If you wish, or it becomes necessary, to use a new card, it must be specially formatted for use in *Pegasus-I*. Please consult the Support document supplied with your system for details of how to do this using *Poseidon*: the process is very straightforward.

## **16. Calibration:**

For best accuracy, the Pegasus-I sensors should be checked and calibrated periodically, preferably at least once per year, through ETB's calibration service. Please contact us to enquire and arrange.

## **17. To get help from ETB:**

**e-mail:** [support@etb.co.uk](mailto:support@etb.co.uk) e-mail is generally our preferred option since for anything other than simple queries, it gives us time to attempt to reproduce the problem. Please try to provide a detailed description of the problem, giving as much detail as you can. Particularly helpful are screen shots copied into a document to show where things appear to be going wrong. Sensor serial number, *Pegasus* firmware issue and *Poseidon* software version may also be useful.

**Telephone:** (office hours, weekdays): +44 (0)1438 822830 (answer-phone facility for out-of-hours)

## **18. Frequently Asked Questions**

### **Screen lock up.**

If you are in the 'region navigator' and pressed publish, you will get a dialogue box asking you to press OK. If you don't do this and mouse click anywhere on the screen, the dialogue box window goes, but you cannot do anything on the screen.

Resolution: Move the mouse to the top bar on the window, left mouse click and hold which allows you to drag the window down toward the bottom of the screen. You will see the dialogue box, just press OK. Now click on the maximise button on the previous window to return the window to the correct position.

### **Plot or statistical table cut off in PDF file**

There are two issues that can cause one of these problems.

Plot cut off: This happens if the paper size in the page set up within the Firefox browser has been changed. Default setting is A3 portrait.

Statistical Table cut off: This occurs if your trial has too many gaits classified. All though you can have the maximum when working in Poseidon, only six will be printed out. If you see the slider bar appear when you are in the 'Region Navigator' you are likely not to get a printout of the gaits seven and eight.